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Update on Pest Management and Crop Development

FRUIT JOURNAL

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INSECTS

SOME'R' HERE

ORCHARD RADAR DIGEST

Roundheaded Appletree Borer
Peak egglaying period roughly: June 14 to June 28.

Codling Moth
Codling moth development as of June 28: 1st generation adult emergence at 100% and 1st generation egg hatch at 92%.

Lesser Appleworm
2nd LAW flight begins around: June 27.

Obliquebanded Leafroller
Where waiting to sample late instar OBLR larvae to determine need for treatment is an option, or to check on results from earlier sprays: Optimum sample date for late instar summer generation OBLR larvae: June 27.

Oriental Fruit Moth
2nd generation - first treatment date, if needed: June 26.

Redbanded Leafroller
2nd RBLR flight peak catch and approximate start of egg hatch: June 28.

Spotted Tentiform Leafminer
Optimum first sample date for 2nd generation STLM sapfeeding mines is June 30.

Lesser appleworm

IN THIS ISSUE...

MODEL BUILDING
Following are the available readings as of today.
Insect model degree day accumulations:

Codling Moth (1st targeted spray application at newly hatching larvae, predicted at 250–360 DD base 50°F after biofix; 2nd targeted spray 14–21 days later):

Location (Weather Sta.)	Biofix	DD (50°F) June 28	Date 250 DD reached	Date 360 DD reached
Highland	May 7	823	May 28	June 3
Burnt Hills (Glens Falls)	May 7	681	May 30	June 5
Marlboro	May 10	816	May 29	June 3
Modena (Clintondale)	May 10	713	May 31	June 5
Newfield (Cornell Orch)	May 11	739	May 30	June 4
Waterport	May 19	776	May 31	June 5
Hilton (Waterport)	May 19	776	May 31	June 5
Lincoln (Farmington)	May 19	672	June 1	June 9
Lyndonville	May 19	702	June 1	June 8
Granville (Clifton Park)	May 21	676	June 2	June 9
Altamont (Guilderland)	May 21	603	June 2	June 8
Lafayette	May 25	551	June 9	June 18
Sodus	May 27	505	June 13	June 20
Wolcott (Sodus)	May 27	505	June 13	June 20
Chazy	May 31	481	June 17	June 21
Alton (Williamson)	June 3	387	June 21	June 25

Obliquebanded Leafroller (estimated start of egg hatch in DD base 43°F after biofix: 50% egg hatch — 630 DD; 90% egg hatch – 810 DD; 100% egg hatch – 950 DD):

Location (Weather Sta.)	Biofix	DD (as of 6/28)
Highland	May 26	868
Waterport	May 28	816
Newfield (Cornell Orch)	June 1	641
Geneva	June 1	653
Lafayette	June 1	609
Wolcott (Sodus)	June 2	578
Lincoln (Farmington)	June 3	569
Sodus	June 3	553
Alton (Williamson)	June 3	562
Hilton (Waterport)	June 4	619
Lyndonville	June 4	568

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This newsletter available online at: http://www.nysaes.cornell.edu/ent/scaffolds/

[NOTE: Consult our insect pest predictions on the NEWA Apple Insect Models web page:
http://newa.nrcc.cornell.edu/newaModel/apple_pest
Find accumulated degree days for the current date with the
Degree Day Calculator:
http://newa.nrcc.cornell.edu/newaLister/dday
Powered by the NYS IPM Program's NEWA weather data and ACIS, Northeast Regional Climate Center]

2-STEP TIME

MITE BE TIME: SOME GUIDING PRINCIPLES OF MITE MANAGEMENT

(Art Agnello, Entomology, Geneva)

❖❖ The encroaching hot temperatures that we have been seeing with some regularity lately are responsible for rapid buildups of European red mite populations in various sites. Now that we are entering another mite control season, it doesn't hurt to quickly go over some basics for maximizing the effectiveness of the tools we have for keeping them under control. Mite management can be considered to be a 2-phase process: 1) An early season program, against the overwintering generation; and 2) A summer program, directed against new populations.

Usually, a preventive approach (i.e., without the need to sample) is advised for early season, depending on the previous year's pressure. Among the options available for this task are: delayed dormant oil, an ovicide-larvacide (Apollo/Savey/Onager/Zeal) applied prebloom or (adding Agri-Mek to the list) after petal fall. For summer populations, scouting and sampling is advised to pick up rapid mite increases on new foliage, especially during early summer, when trees are most susceptible. During this phase, thresholds increase as the summer goes on and the trees become more tolerant of mite feeding. When the numbers of motiles (everything but eggs) reach or approach threshold, a "rescue" material can be recommended, among them are: Acramite, Apollo, Kanemite, Nexter, Onager, Portal, Savey, Vendex, and Zeal.

Because mites have many generations per year, they have a high potential to develop resistance. Some major differences between resistance management programs for fungicides vs. insecticides and miticides are:

1 - Insect and mite resistance is not promoted by using low dosages of materials; i.e., it doesn't cause a populations shift in their susceptibility, as can occur with pathogens.

2 - Frequent applications of high rates usually will not prevent or slow down the development of insect and mite resistance.

3 - Usually, high dosages are not toxic to resistant insects or mites, but they do kill a greater number of susceptible individuals.

Recall that resistant mites are theoretically "less fit" or weaker than susceptible individuals. They have shorter lives, are physically smaller or weaker, produce fewer offspring, take longer to develop, and their mating success is lower. In the absence of competition from susceptible individuals, resistant pests rapidly multiply.

The key to management of resistance to insecticides and miticides is to reduce selection pressure that favors the survival of resistant individuals. Some tactics for doing this are:

- Treat different generations with materials of different chemical classes.
- Use nonchemical control tactics where possible (e.g., biological control by encouraging predators).
- Use good miticide stewardship: apply only when necessary; use correct dosages; obtain adequate coverage; and optimize your timing.

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Back in 1992, our miticide choices were not very numerous: oil, Morestan (prebloom), Vydate, Omite, Carzol, and Kelthane. We have many more options today, but it's important to keep in mind how they may (OR may not) differ:

[1A] Carzol: carbamate; acetylcholinesterase inhibitor
[12B] Vendex: disrupts ATP formation
[6] Agri-Mek: GABA (neurotransmitter) site; affects chlorine ion channel;
inhibits nerve transmissions
[25] Acramite: GABA (neurotransmitter) site (probably); contact activity
[10A] Apollo/Savey/Onager: growth inhibitors
[10B] Zeal: growth inhibitor
[20B] Kanemite: METI (mitochondrial electron transport inhibitor), Site II
[21] Nexter/Portal: METI (mitochondrial electron transport inhibitor), Site I

These numbers are assigned by IRAC (Insecticide Resistance Action Committee), which is an international organization of researchers and scientists committed to prolonging the effectiveness of pesticides at risk for resistance development. The number codes represent Mode of Action Classification Groups. An arthropod population is more likely to exhibit cross-resistance to materials within the same group, so if you're seeing (or anticipating) reduced efficacy from a miticide that may have been effective in the past, it would be advisable to switch to a material that's in a different IRAC grouping.

For more information on this effort, see: http://www.irac-online.org/ ❖❖

HOME TEAM

RELYING ON THE LOCALS
(Art Agnello, Entomology, Geneva)

❖❖ There are many insects present in apple orchards that provide a benefit to growers by feeding on pest species. It is important that growers and orchard managers be able to recognize these natural enemies, so that they are not mistaken for pests. The best way to conserve beneficial insects is to spray only when necessary, and to use materials that are less toxic to them (see Tables 6.1.1 & 7.1.1, pp. 58 and 65 of the Recommends). This brief review, taken from IPM Tree-Fruit Fact Sheet No. 18 (available online at: http://www.nysipm.cornell.edu/factsheets/treefruit/pests/ben/ben.asp), covers the major beneficial insects that are likely to be seen in N.Y. orchards, concentrating on the most commonly seen life stages. Factsheet No. 23, "Predatory Mites" (online: http://www.nysipm.cornell.edu/factsheets/treefruit/pests/pm/pm.asp), reviews mites that are important predators of leaf-feeding mites.

CECIDOMYIID LARVAE (*Aphidoletes aphidimyza*)

These gall midge flies (Family Cecidomyiidae) are aphid predators, and overwinter as larvae or pupae in a cocoon. Adults emerge from this cocoon, mate, and females lay eggs among aphid colonies. The adults are delicate, resembling mosquitoes, and are not likely to be seen. The eggs are very small (about 0.3 mm or 1/85 in long) and orange. They hatch into small, brightly colored, orange larvae that can be found eating aphids on the leaf surface. These predacious larvae are present from mid-June throughout the summer. There are 3–6 generations per year. In addition to aphids, they also feed on soft-bodied scales and mealybugs.

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SYRPHID FLY LARVAE (Family Syrphidae)

The Family Syrphidae contains the "hover flies", so named because of the adults' flying behavior. They are brightly colored with yellow and black stripes, resembling bees. Syrphids overwinter as pupae in the soil. In the spring, the adults emerge, mate, and lay single, long whitish eggs on foliage or bark, from early spring through midsummer, usually among aphid colonies. One female lays several eggs. After hatching, the larvae feed on aphids by piercing their bodies and sucking the fluids, leaving shriveled, blackened aphid cadavers. These predacious larvae are shaped cylindrically and taper toward the head. There are 5–7 generations per year. Syrphid larvae feed on aphids, and may also feed on scales and caterpillars.

LADYBIRD BEETLES (Family Coccinellidae)

• Stethorus punctum: This ladybird beetle is an important predator of European red mite in parts of the northeast, particularly in Pennsylvania, and has been observed intermittently in the Hudson Valley of N.Y., and occasionally in western N.Y. Stethorus overwinters as an adult in the "litter" and ground cover under trees, or in nearby protected places. The adults are rounded, oval, uniformly shiny black, and are about 1.3–1.5 mm (1/16 in) long. Eggs are laid mostly on the undersides of the leaves, near the primary veins, at a density of 1–10 per leaf. They are small and pale white, and about 0.3–0.4 mm (1/85 in) long. Eggs turn black just prior to hatching. The larva is gray to blackish with numerous hairs, but becomes reddish as it matures, starting on the edges and completing the change just prior to pupation. There are 3 generations per year in south-central Pennsylvania, with peak periods of larval activity in mid-May, mid-June and mid-August. The pupa is uniformly black, small and flattened, and is attached to the leaf.

• Other Ladybird Beetles: Ladybird beetles are very efficient predators of aphids, scales and mites. Adults are generally hemisphere-shaped, and brightly colored or black, ranging in size from 0.8 to over 8 mm (0.03–0.3 in). They overwinter in sheltered places and become active in the spring. Eggs are laid on the undersides of leaves, usually near aphid colonies, and are typically yellow, spindle-shaped, and stand on end. Females may lay hundreds of eggs. The larvae have well-developed legs and resemble miniature alligators, and are brightly colored, usually black with yellow. The pupal case can often be seen attached to a leaf or branch. There are usually 1–2 generations per year. One notable species that is evident now is Coccinella septempunctata, the sevenspotted lady beetle, often referred to as C-7. This insect, which is large and reddish-orange with seven distinct black spots, was intentionally released into N.Y. state beginning in 1977, and has become established as an efficient predator in most parts of the state.

LACEWINGS (Family Chrysopidae)

Adult lacewings are green or brown insects with net-like, delicate wings, long antennae, and prominent eyes. The larvae are narrowly oval with two sickle-shaped mouthparts, which are used to pierce the prey and extract fluids. Often the larvae are covered with "trash", which is actually the bodies of their prey and other debris. Lacewings overwinter as larvae in cocoons, inside bark cracks or in leaves on the ground. In the spring, adults become active and lay eggs on the trunks and branches. These whitish eggs are laid singly and can be seen connected to the leaf by a long, threadlike "stem". Lacewings feed on aphids, leafhoppers, scales, mites, and eggs of Lepidoptera (butterflies and moths).

TRUE BUGS (Order Hemiptera)

There are many species of "true bugs" (Order Hemiptera) such as tarnished plant bug, that feed on plants, but a number of them are also predators of pest species. The ones most likely to be seen are "assassin bugs" or reduviids (Family Reduviidae), and "damsel bugs" or nabids (Family Nabidae). These types of predators typically have front legs that are efficient at grasping and holding their prey.

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PARASITOIDS

Parasitoids are insects that feed on or in the tissue of other insects, consuming all or most of their host and eventually killing it. They are typically small wasps (Order Hymenoptera; e.g., families Ichneumonidae, Braconidae, Chalcididae), or flies (Order Diptera; e.g., family Tachinidae). Although the adult flies or wasps may be seen occasionally in an orchard, it is much more common to observe the eggs, larvae, or pupae in or on the parasitized pest insect. Eggs may be laid directly on a host such as the obliquebanded leafroller, or near the host, such as in the mine of a spotted tentiform leafminer. After the parasitoid consumes the pest, it is not unusual to find the parasitized larvae or eggs of a moth host, or aphids that have been parastized ("mummies"). Exit holes can be seen where the parasitoid adult has emerged from the aphid mummy.

GENERALIST PREDATORS

There is a diversity of other beneficial species to be found in apple orchards, most of which are rarely seen, but whose feeding habits make them valuable additions to any crop system. The use of more selective pesticides helps to maintain their numbers and contributes to the level of natural control attainable in commercial fruit plantings. Among these beneficials are:

• Spiders (Order Araneida): All spiders are predaceous and feed mainly on insects. The prey is usually killed by the poison injected into it by the spider's bite. Different spiders capture their prey in different ways; crab spiders (Thomisidae and Philodromidae) and jumping spiders (Salticidae) forage for and pounce on their prey — the crab spiders lie in wait for their prey on flowers — and web-building spiders (e.g., Araneidae, Theridiidae, and Dictynidae) capture their prey in nets or webs.

• Ants (Family Formicidae): The feeding habits of ants are rather varied. Some are carnivorous, feeding on other animals or insects (living or dead), some feed on plants, some on fungi, and many feed on sap, nectar, honeydew, and similar substances. Research done in Washington has shown certain species (Formica spp.) of ants to be effective predators of pear psylla.

• Earwigs (Family Forficulidae): Although these insects may sometimes attack fruit and vegetable crops, those found in apple orchards are probably more likely to be scavengers that feed on a variety of small insects. ❖❖

UP AND COMING

EVENT REMINDER

Cornell Fruit Field Days, July 28–29

❖❖ Cornell University will host the 2010 Fruit Field Days at the New York State Agricultural Experiment Station in Geneva, NY, on Wednesday and Thursday, July 28 & 29, from 8:00 a.m. to 5:00 p.m each day. Grapes and berry fruits will be the focus on July 28, and tree fruits will be covered on July 29.

Pre-registration is required, and can be done either online (via credit card) or by mailing in a check plus the registration form. Both registration methods, as well as tentative presentation titles, are available through the NYSAES web page (http://www.nysaes.cornell.edu/) and the Cornell Fruit web page (http://www.fruit.cornell.edu/). The cost of registration is $15 per person for single-day attendance and $25 for both days; lunch will be provided each day. For sponsorship and exhibitor information, contact Debbie Breth at 585-798-4265 or dib1@cornell.edu. ❖❖

GENERAL INFO

DISEASES

LITTLE TIME TO LEAF

FUNGICIDE RESISTANCE SURVEY – FOLLOW-UP REQUEST
(Kerik Cox, Plant Pathology, Geneva)

❖❖ We're deep into the 2010 Site-Specific Fungicide Resistance Testing Survey. Some orchards are already being tested. There is still time to send us samples for the 2010 testing. However, we are approaching the time at which scab lesions are often heat-killed or colonized by contaminants, so please send us leaves soon. You can find everything you need for the submission process at our website:
http://www.nysaes.cornell.edu/pp/extension/tfabp/smor.htm

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PEST FOCUS

Geneva: **Oriental fruit moth** 2nd flight began 6/24. **Apple maggot** trap catch increasing.

Highland:
Japanese beetle adults and feeding observed. **Potato leafhopper** adult and nymph feeding damage observed. **Obliquebanded leafroller** larval fruit and foliar feeding damage observed. **Redbanded leafroller** 2nd flight beginning. **Codling moth** larval feeding and frass observed on fruit.

FIELD NOTES

Regional Trap Numbers
Week Ending 6/28, Avg No./trap

Location/County	Date	STLM	OFM	LAW	CM	OBLR
Lyndonville/Orleans	6/24	142	0.7	21.0	3.3	1.0
Waterport/Orleans	6/24	99.7	1.3	39.3	1.3	0.3
Hilton/Monroe	6/24	702	0.0	14.7	4.7	6.0
Lincoln/Wayne	6/25	133	1.0	13.7	3.7	0.0
Sodus-Lakesite/Wayne	6/25	19.3	0.0	0.0	0.7	2.7
Sodus-Inland/Wayne	6/23	9.7	0.0	0.0	0.0	4.3
Alton/Wayne	6/22	26.0	0.0	1.0	0.0	2.0
Wolcott/Wayne	6/22	32.3	0.0	2.3	1.7	1.3
Newfield/Tompkins	6/21	915	0.0	0.0	1.0	4.0
Lafayette/Onondaga	6/21	185	0.0	9.7	3.0	0.3
Chazy/Clinton	6/22	708	1.3	8.3	0.0	0.3
Valcour/Clinton	6/22	690	1.3	21.3	0.3	0.0
Peru/Clinton	6/22	648	0.0	7.3	0.0	0.0
Granville/Washington	6/25	486	0.7	74.3	7.7	12.3
Burnt Hills/Saratoga	6/25	827	0.5	1.0	39.0	6.0
Altamont/Albany	6/25	1350	0.0	0.5	32.0	15.0
Modena/Ulster	6/24	93	1.0	1.0	2.0	56.5
Marlboro/Ulster	6/24	775	0.5	3.5	4.5	39.5
Accord/Ulster	6/28	339	0.0	16.0	0.0	8.0

INSECT TRAP CATCHES (Number/Trap/Day)

Geneva, NY

	6/21	6/24	6/28
Redbanded leafroller	0.3*	0.5	0.1
Spotted tentiform leafminer	4.3	3.3	3.9
Oriental fruit moth	0.3	1.0*	0.6
Lesser appleworm	0.1	0.0	0.0
American plum borer	0.1	0.0	0.0
Lesser peachtree borer	0.0	0.0	0.0
San Jose scale	0.0	0.0	0.0
Pandemis leafroller	0.6	0.0	0.1
Obliquebanded leafroller	0.0	0.0	0.1
Peachtree borer	0.4	0.5	0.3
Apple maggot	0.3	1.5	1.9

* first catch

Highland, NY

	6/21	6/28
Redbanded leafroller	0.0	1.9
Spotted tentiform leafminer	105	123.3
Oriental fruit moth	1.6	1.8
Lesser appleworm	2.6	1.1
Codling moth	0.4	0.0
Obliquebanded leafroller	8.9	5.4
Apple maggot	0.0	2.8*

UPCOMING PEST EVENTS

	43°F	50°F
Current DD accumulations (Geneva 1/1–6/28/10):	1571	1025
(Geneva 1/1–6/28/2009):	1294	777
(Geneva "Normal"):	1328	829
(Geneva 1/1–7/5 predicted):	1754	1158
(Highland 3/1–6/28/10):	1801	1186

Coming Events:	Ranges (Normal ±StDev):	
Lesser appleworm 2nd flight begins	1409–1951	916–1280
Obliquebanded leafroller summer larvae hatch	1038–1460	625–957
Spotted tentiform leafminer 2nd flight peak	1360–1790	846–1190
STLM 2nd gen. tissue feeders present	1378–2035	913–1182
American plum borer 2nd flight begins	1494–2034	988–1340
Codling moth 1st flight subsides	1280–1858	811–1225
Codling moth 2nd flight begins	1569–2259	1023–1515
Comstock mealybug 1st adult catch	1308–1554	809–1015
Comstock mealybug 1st flight peak	1505–1731	931–1143
Oriental fruit moth 2nd flight begins	1277–1487	785–965
Oriental fruit moth 2nd flight peak	1455–1935	925–1295
Pandemis leafroller flight subsides	1403–1633	874–1040
Obliquebanded leafroller 1st flight subsides	1612–1952	1048–1302
Redbanded leafroller 2nd flight peak	1546–1978	991–1323
San Jose scale 2nd flight begins	1593–1929	1029–1291

NOTE: Every effort has been made to provide correct, complete and up-to-date pesticide recommendations. Nevertheless, changes in pesticide regulations occur constantly, and human errors are possible. These recommendations are not a substitute for pesticide labelling. Please read the label before applying any pesticide.

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